The PairMaster
LAN CABLE TEST SET
FROM TRIPLETT CORPORATION

INSTRUCTION MANUAL

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

- *Before using the PairMaster, read all instructions.*

- *Use of an attachment not recommended or sold by Triplett Corporation may result in a risk of fire, electric shock, or injury to persons.*

- *Do not attempt to service this unit. There are no customer serviceable parts inside this unit. Send to Triplett's service center.*

- ***WARNING:** This test set has been designed with your safety in mind. However, no design can completely protect against incorrect use. Any electrical circuit can be dangerous and or lethal when lack of caution or poor safety practices are used.*

SAFETY IS NO ACCIDENT!!!

PN 84-740
8/94

PAIRMASTER ACCESSORIES

DESCRIPTION	Cat. No.
Remote Identifier #1	3240-1
Remote Identifier #2	3240-2
Remote Identifier #3	3240-3
Remote Identifier #4	3240-4
Remote Identifier #5	3240-5
Remote Identifier #6	3240-6
Remote Identifier #7	3240-7
Remote Identifier #8	3240-8
Remote Identifier #9	3240-9
Remote Identifier #10	3240-10
Remote Identifier #11	3240-11
Remote Identifier #12	3240-12
Remote Identifier #13	3240-13
Remote Identifier #14	3240-14
Remote Identifier #15	3240-15
Remote Identifier #16	3240-16
Remote Identifiers #1 to #4	3240-17
Remote Identifiers #5 to #8	3240-18
Remote Identifiers #9 to #12	3240-19
Remote Identifiers #13 to #16	3240-20
Hard-Sided Carrying Case w/strap	10-3959
Soft Carrying Case	10-2961
RJ-45 Patch Cable (Category 5)	26-889
RJ In-Line Coupler	2455-781

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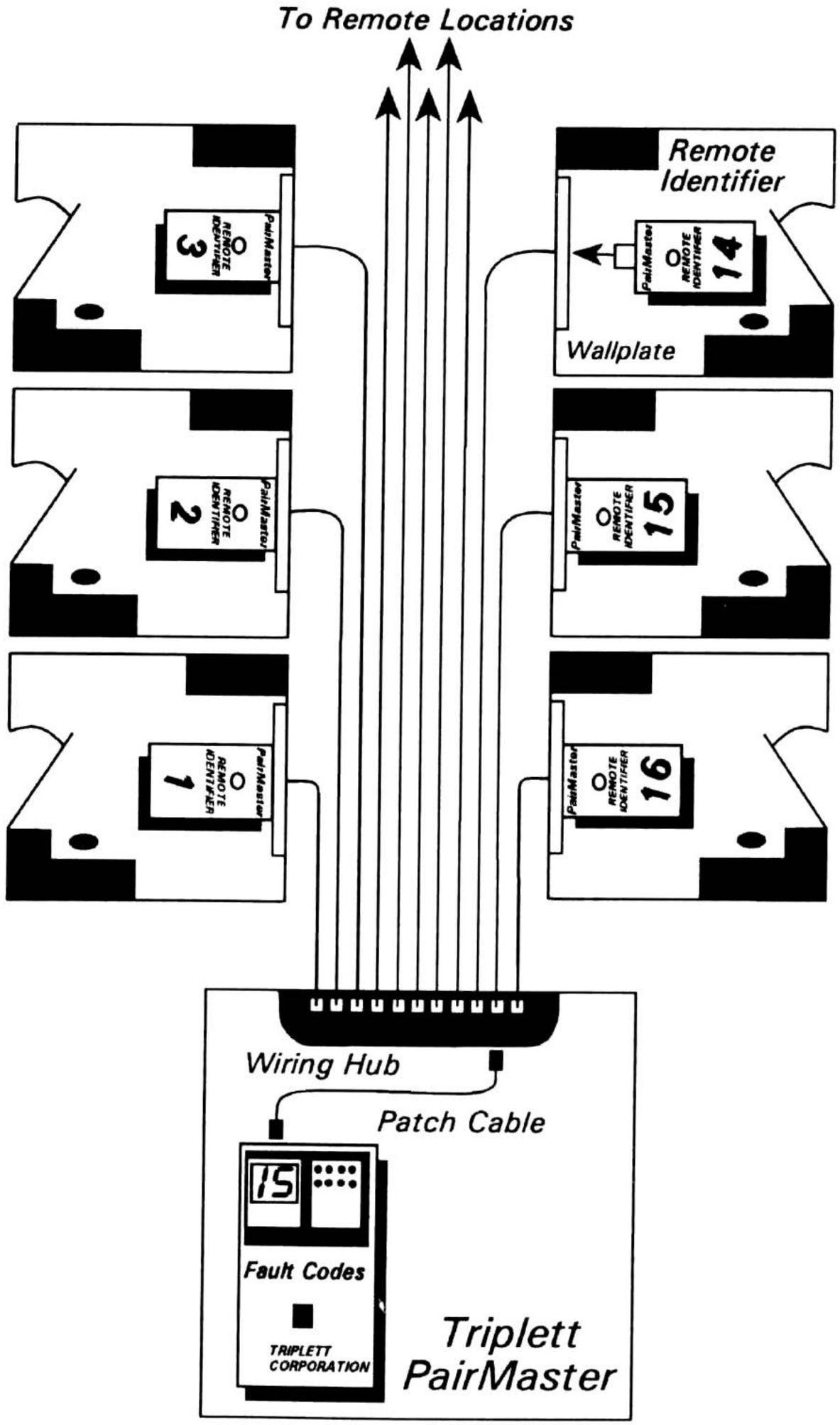
PAIRMASTER OVERVIEW

The PairMaster gives the user the ability to verify three basic requirements for LAN cabling. First, the PairMaster will check the point to point wiring. These tests, commonly called wire-mapping, tell the user whether or not the individual conductors within the cable are wired correctly at both ends. Another test, NEXT (Near End Crosstalk), checks each pair of the cable for excessive A.C. coupling to the other pairs. The third major feature is the ability to identify which cable in the bundle is connected to the PairMaster. In a typical LAN installation, the individual workstations are connected to a central wiring hub. By connecting the sixteen Remote Identifiers to the workstation ends of the cables, the user can easily document the network topology from one location (see Fig. 1).



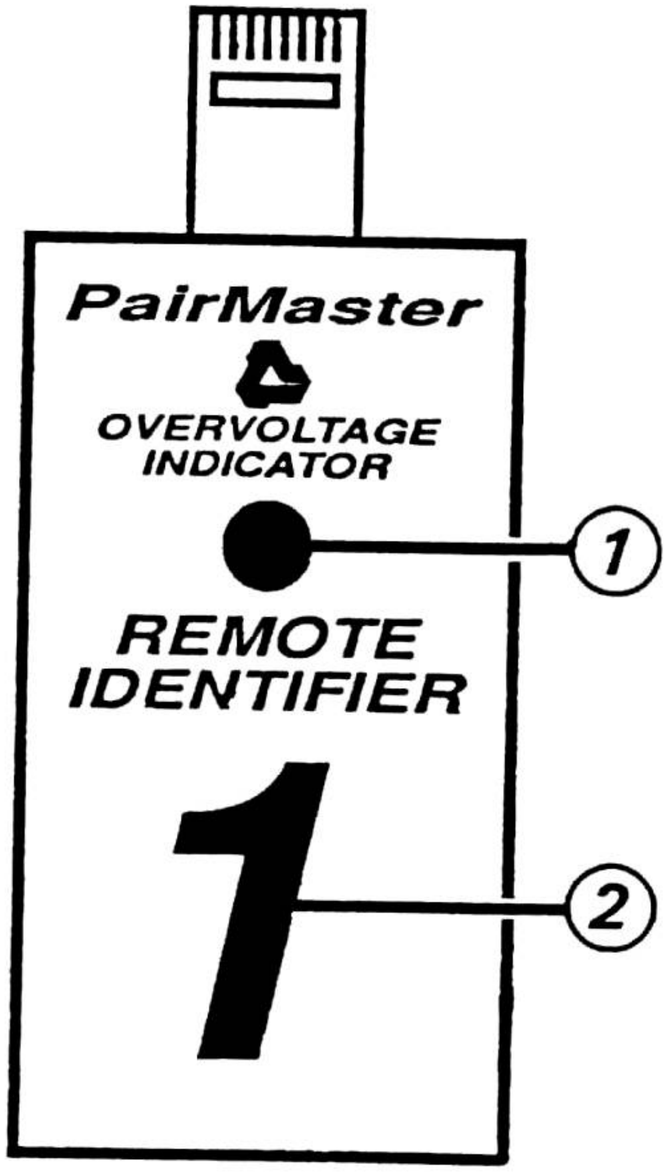
Cable Identification - User Diagram
Figure 1

FEATURES

1) OVERVOLTAGE INDICATOR LED

The LED on the Remote Identifier will light up whenever Telco voltages are detected on the cable under test.

Example: Connecting the remote onto a cable that is energized by a 48 VDC Central Office Battery will cause the OVERVOLTAGE INDICATOR LED to light up. The LED will remain ON until the overvoltage condition is corrected or the Remote Identifier is removed from the cable.



2) REMOTE IDENTIFIER

The Remote Identifier is a small module that is connected to the far end of the cable. Each Identifier properly terminates the cable. It also contains circuitry to allow the PairMaster to verify proper wiring within the cable. Sixteen unique remote units, numbered from 1 to 16, can be used to identify a particular cable in a bundle.

3) RJ-45 MODULAR JACK

This jack is a standard 8-pin modular jack for connecting UTP (Unshielded Twisted Pair) cable to the PairMaster. The jack is keyed so that it can accept either keyed or non-keyed RJ-45 plugs.

4) SEVEN SEGMENT DISPLAYS

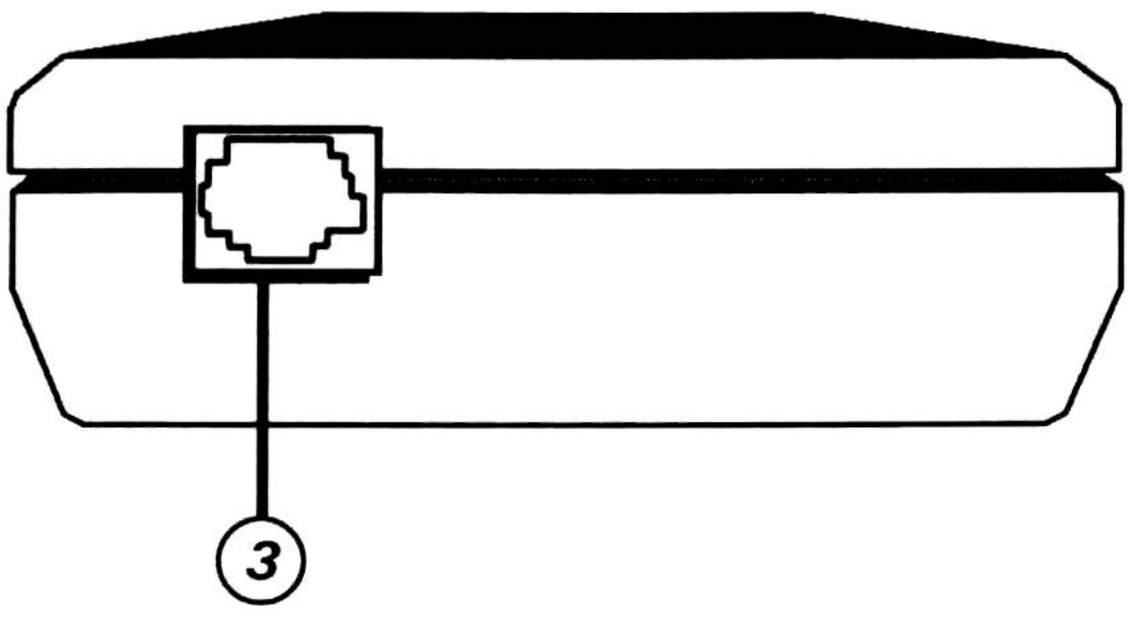
Under PASS conditions, the two digit display shows the number of the Remote Identifier attached to the cable. Under FAIL conditions the appropriate Fault Code is displayed (see page 11).

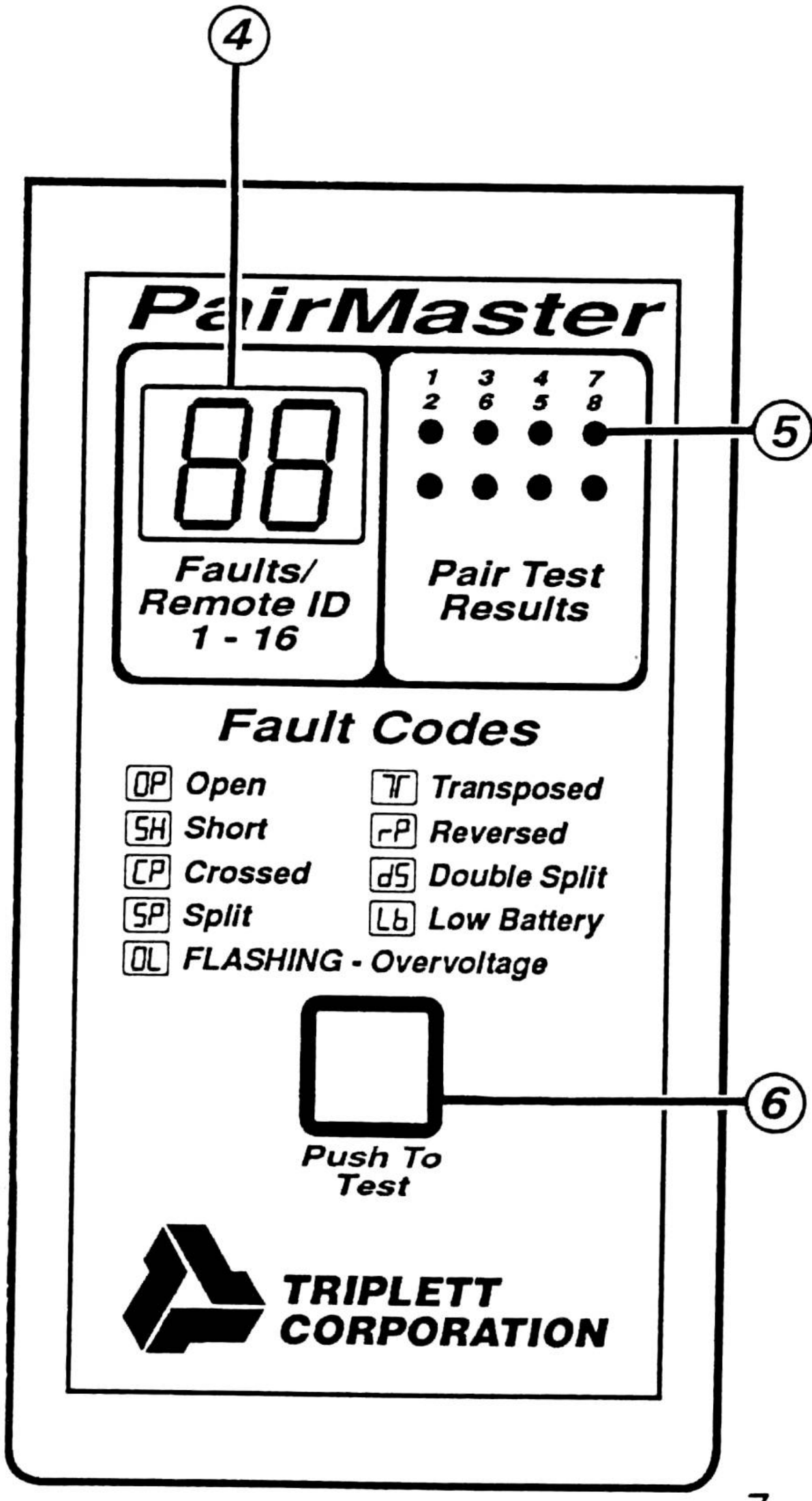
5) PASS/FAIL LEDs

Each pair in the cable (Conductors 1/2, 3/6, 4/5, 7/8) have one green LED (PASS) and one red LED (FAIL). The LEDs light up, based on the test results of each pair.

6) PUSH-TO-TEST BUTTON (PTT)

Press this button to start a new test.





OPERATING INSTRUCTIONS

Connect each Remote Identifier into the terminal jack of an office. Observe the OVERVOLTAGE INDICATOR LED on the remote. If the LED is on, Telco voltage is present. Remove the Remote Identifier and investigate the problem. The PairMaster is not intended for use on public telephone systems.

**** **WARNING** *** Never connect any LAN device to an overvoltage line. Damage to the hub or to the terminal may result.*

Connect the RJ-45 patch cable to the wiring hub's patch panel. Plug the other end of the patch cable into the PairMaster's RJ-45 jack.

*** **NOTE** ** Using the patch cable and the in-line couplers is recommended to reduce wear on the PairMaster's RJ-45 jack.*

Press the PUSH-TO-TEST (PTT) button to begin testing the cable for proper wiring. Observe the seven segment display. Upon pressing the PTT button, one of three displays will be shown. Under normal conditions the segments will read "--" for about one second. This shows the user that the PairMaster is beginning to test the cable. When the battery voltage is low the segments will read "Lb". instead of "--". The PairMaster is still beginning to test the cable, but erroneous readings may occur. Whenever "Lb" appears, the user should replace the 9 volt battery. The third display occurs when the PairMaster is connected to a Telco energized cable. The display will flash "OL" until the overvoltage is removed. After removing the

PairMaster from the energized line, the user must wait for about 15 seconds before pressing the PTT button. The internal power supply in the PairMaster will not be able to reactivate until its time-out period has expired (about 15 seconds).

*** **NOTE** ** In the event that the PairMaster and the Remote Identifier are both connected to a Telco energized cable, only the PairMaster will give an overvoltage (OL) indication. The OVERVOLTAGE INDICATOR LED will not light under these conditions. In most situations, the Remote Identifier will be connected to the line first. If a problem exists, the user can tell if the line is energized immediately. At the wiring hub (in another office) the user can determine an overvoltage condition by using the PairMaster itself.*

Following the initial message at power-up, the PairMaster tests each pair of the cable sequentially. The pairs consist of the following conductors: 1/2, 3/6, 4/5, 7/8. The PASS/FAIL results of each pair are displayed immediately following that pair's tests.

If the pair has passed all tests, the green LED below the pair number will light. The seven segment LEDs will display the number of the Remote Identifier connected to the other end of the cable.

If the pair fails one or more of the tests, the red LED below the pair number will light. The seven segment LEDs will display the FAULT CODE associated with the failure. In the event of a multiple failure on a single pair, the highest priority fault will be displayed. The fault codes are listed in order of priority on page 10.

POWER-UP: *Displayed immediately after push-to-test (PTT) button is pressed, if everything is under normal conditions.*

LOW BATTERY: *Displayed immediately after push-to-test button is pressed if battery voltage is less than 6.5 volts.*

FAULT CODES

OVERVOLTAGE: *Damaging voltage is present on the cable. The unit will flash "OL" until the damaging voltage is removed or until time out of the power supply.*

OPEN PAIR: *Either conductor of a pair does not have continuity.*

SHORTED PAIR: *Both conductors of a pair are shorted together.*

CROSSED PAIR: *One conductor of a pair is shorted to a conductor of another pair.*

SPLIT PAIR: *One conductor of a pair is connected to the wrong destination at the other end of the cable.*

TRANSPOSED PAIR: *Both conductors of a pair are connected to the wrong destination at the other end of the cable.*

REVERSED PAIR: *The conductors of an individual pair are reversed in polaritry at one end of the cable.*

DOUBLE SPLIT PAIR: *The conductors of two pairs have correct continuity but have excessive AC crosstalk.*

NO ID: *(Flashes) The cable can not be identified.*

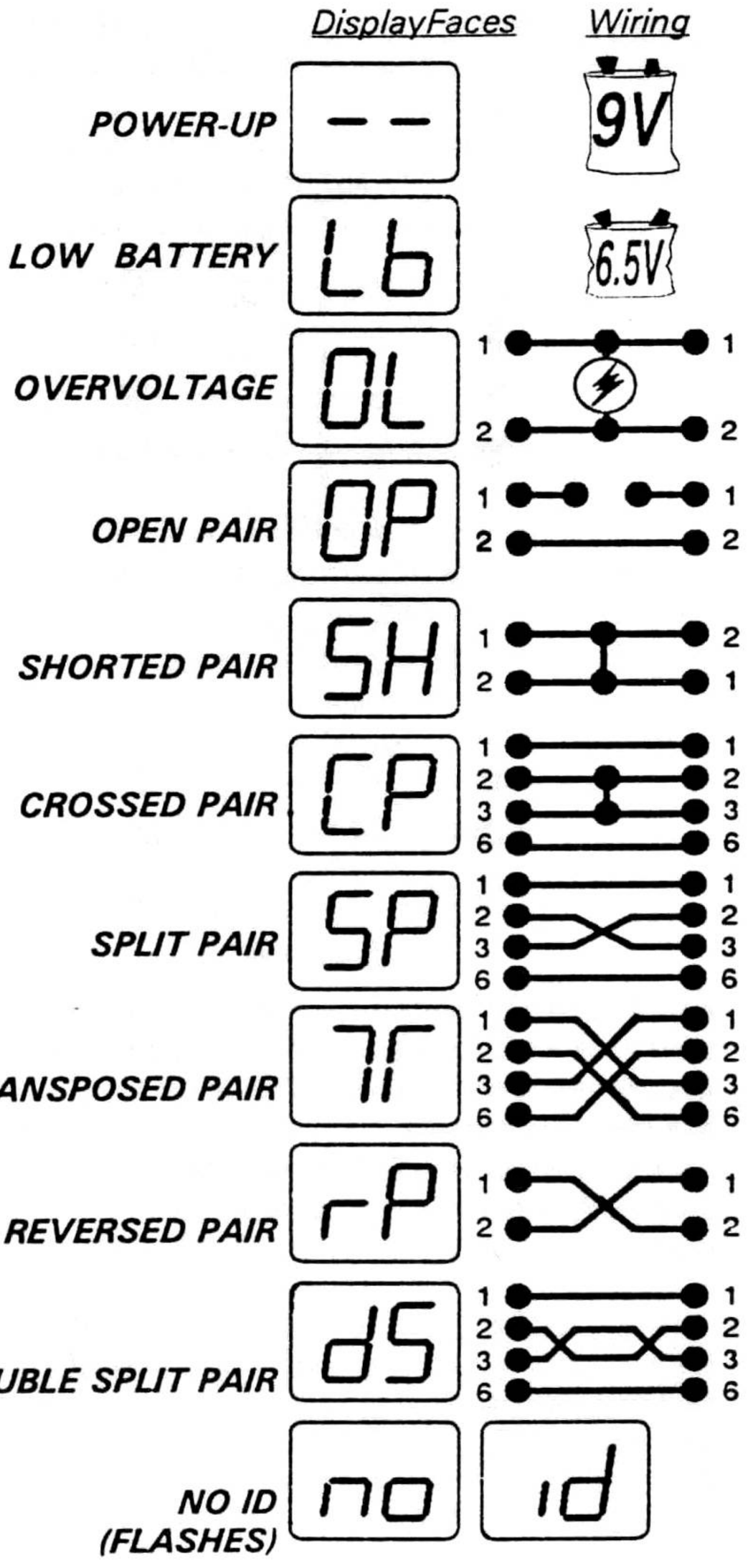


Figure 2

A multiple failure on a pair is a condition where more than one fault is present. One example of this is when a pair has one conductor open and the other conductor crossed (short circuited) to another pair (Fig. 3). The first will indicate an open pair and the second will indicate a crossed pair.

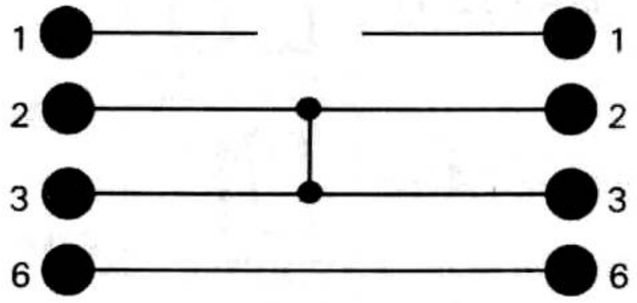


Figure 3

Another example of a multiple failure is when two pairs are transposed, and one of the transposed pairs is reversed in polarity (Fig. 4).

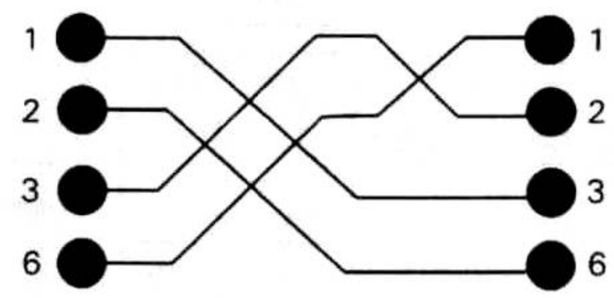
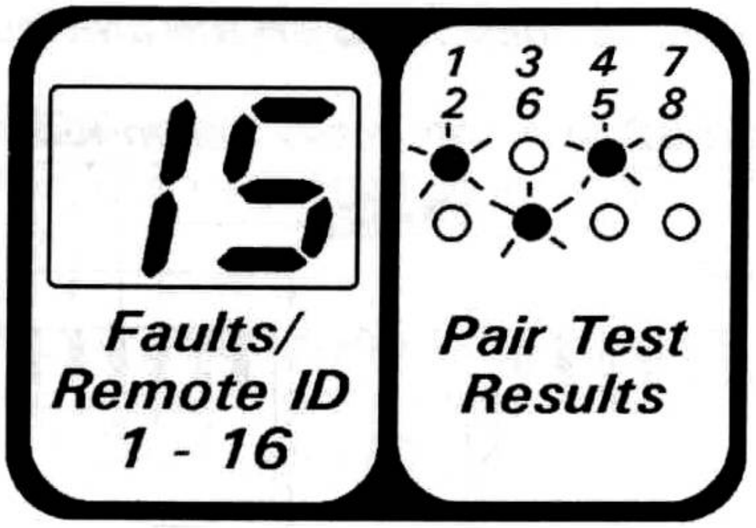


Figure 4

Under both situations, the PairMaster will still display a FAIL LED but will only inform the user of the highest priority fault. The user, upon checking the pair, will discover the lower priority fault also. In most applications, the cable is wired incorrectly and will require rewiring regardless of the error displayed.

The PASS/FAIL LED of each pair, will retain its status until all of the pairs are tested. At the conclusion of testing all four pairs, the seven segment LEDs will display the number of the Remote Identifier for about two seconds. If the cable can not be identified (typically when all pairs are shorted or open), a "no" "id" message will

flash. When the final display is over, the PairMaster will shut itself off. Another cable can be tested by repeating this procedure.



Example of a PairMaster in use.
Figure 5

The sample display shown above, indicates that the PairMaster is connected to the cable with Remote Identifier #15 attached to the far end. Pair 1/2 is O.K., pair 3/6 has a failure, pair 4/5 is O.K., and pair 7/8 has yet to be tested.

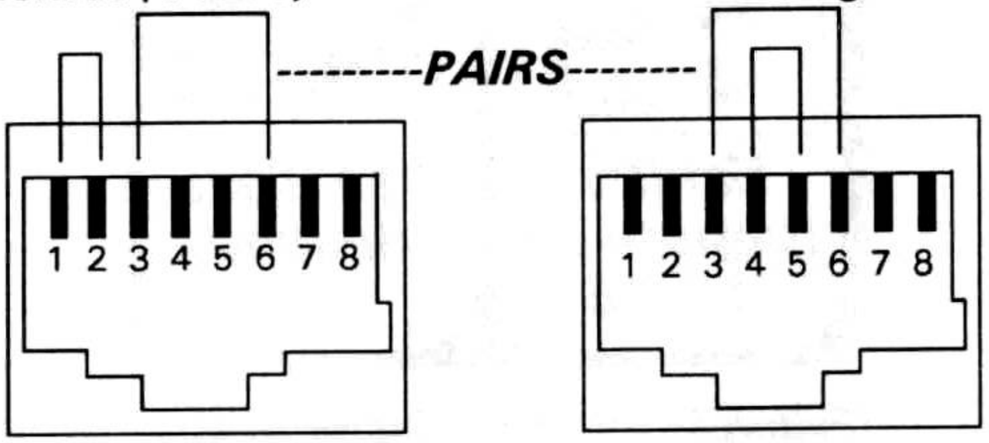
SPECIAL CABLE TESTING

The PairMaster is designed to test 4 pair cables wired in accordance with the EIA/TIA 568 wiring standard. However, many LAN installations, such as Ethernet or Token-Ring, require an 8 pin RJ-45 connection but only use two of the four pairs (see fig. 6). These two types of configurations are no problem for the PairMaster.

When testing two pair Ethernet (10 Base-T) cables, the PairMaster will give actual test results for pairs 1/2 and 3/6. On pairs 4/5 and 7/8 the unit will display "OP" and light up the associated FAIL LEDs. As long as the green PASS LEDs light up on pairs 1/2 and 3/6, the two pair cable can be used for Ethernet installations.

Testing two pair Token-Ring cables is similar to testing the Ethernet cables. The difference is that instead of pairs 1/2 and 3/6, the usable readings occur on pairs 3/6 and 4/5. Pairs 1/2 and 7/8 will display (OP), as described on the previous page.

Ethernet (802.3) ***Token-Ring (802.5)***



Pair	Contact	Function
1/2	1	Tip
	2	Ring
3/6	3	Tip
	6	Ring
4/5	4	Not Used
	5	
7/8	7	Not Used
	8	

Pair	Contact	Function
1/2	1	Not Used
	2	
3/6	3	Tip
	6	Ring
4/5	4	Ring
	5	Tip
7/8	7	Not Used
	8	

Figure 6

SPECIFICATIONS

CABLE TYPES: *EIA/TIA 568 configuration for UTP Ethernet and Token Ring.*

CABLE PAIRS TESTED: *1/2, 3/6, 4/5, 7/8*

CONNECTOR: *RJ-45*

FAULTS DETECTED: *Open pairs, Shorted pairs, Crossed pairs, Split Pairs, Transposed Pairs, Reversed pairs, and Double Split pairs - NEXT less than 21 dB +/- 4 dB*

DISPLAY LEDs: *Two seven segment displays, Four PASS LEDs (Green), Four FAIL LEDs (Red)*

INPUT PROTECTION: *Withstands 56 VDC limited by 400 ohms series resistance. Withstands 175 V peak 20 - 60 Hz with 100 ohms series impedance superimposed onto 56 VDC for 100 mS. (Standard TELCO signals).*

PAIRMASTER (with input protection): *Overvoltage conditions are reported by a flashing "OL" on the display.*

REMOTE IDENTIFIER (with input protection): *Overvoltage conditions are reported by the OVERVOLTAGE INDICATOR LED lighting up.*

**** WARNING *** *Connecting either the PairMaster or the Remote Identifiers to a live power system (110 VAC 60 Hz) will result in permanent damage.*

MAXIMUM CABLE LENGTH: *400 ft. (122 meters)*

ANOMALIES IN IMPEDANCE: *Improper characteristic impedances may result in false readings (Incorrect ID indication). Excessive cable lengths may also cause erroneous readings.*

POWER SUPPLY:
PairMaster: 9 Volt Alkaline Battery
Remote Identifier: Passive - no battery required.

ENVIRONMENT:
Storage: -20°C to 60°C
Operating: 0°C to 50°C

SIZE:	*L x W x H*
PairMaster:	*6.0 x 3.3 x 1.3 inches (152 x 84 x 33 mm)*
Remote Identifier:	*2.6 x 1.4 x 0.6 inches (66 x 35 x 14 mm)*

WEIGHT:		
	PairMaster	*9.2 oz.*
	Remote Identifier	*1.2 oz.*

LIMITED WARRANTY

The Triplett Corporation warrants instruments and test equipment manufactured by it to be free from defective material or workmanship and agrees to repair or replace such products which, under normal use and service, disclose the defect to be the fault of our manufacturing, with no charge within two years (PairMaster) - one year (Remotes) of the date of original purchase for parts and labor. If we are unable to repair or replace the product, we will make a refund of the purchase price. Consult the Instruction Manual for instructions regarding the proper use and servicing of instruments and test equipment. Our obligation under this warranty is limited to repairing, replacing, or making refund on any instrument or test equipment which proves to be defective within two years (PairMaster) - one year (Remotes) from the date of original purchase.

This warranty does not apply to any of our products which have been repaired or altered by unauthorized persons in any way so as, in our sole judgment, to injure their stability or reliability, or which have been subject to misuse, abuse, misapplication, negligence, accident or which have had the serial numbers altered, defaced, or removed. Accessories, including batteries and fuses not of our manufacture used with this product are not covered by this warranty.

To register a claim under the provisions of this warranty, return the instrument or test equipment to Triplett Corporation, Bluffton, Ohio 45817, transportation prepaid. Upon our inspection of the product, we will advise you as to the disposition of your claim.

ALL WARRANTIES IMPLIED BY LAW ARE HEREBY LIMITED TO A PERIOD OF TWO YEARS (PAIRMASTER) - ONE YEAR (REMOTES) AND THE PROVISIONS OF THE WARRANTY ARE EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES EXPRESSED OR IMPLIED.

The purchaser agrees to assume all liability for any damages and bodily injury which may result from the use or misuse of the product by the purchaser, his employees, or others, and the remedies provided for in this warranty are expressly in lieu of any other liability Triplett Corporation may have, including incidental or consequential damages.

Some states (USA ONLY) do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. No representative of Triplett Corporation or any other person is authorized to extend the liability of Triplett Corporation in connection with the sale of its products beyond the terms hereof.

Triplett Corporation reserves the right to discontinue models at any time, or change specifications, price or design, without notice and without incurring any obligation.

This warranty gives you specific legal rights, and you may have other rights which vary from state to state.

TRIPLETT CORPORATION, BLUFFTON, OHIO